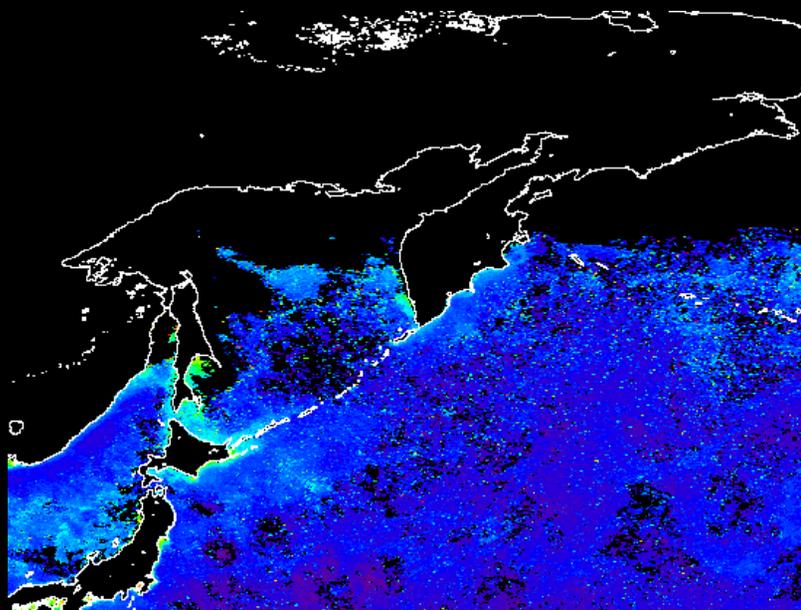


Temporal and spatial variability of phytoplankton biomass and productivity in the Eastern Kamchatka Current region and along the Kuril Islands

○ Hiroki Takemura (*Hokkaido University, Japan*)

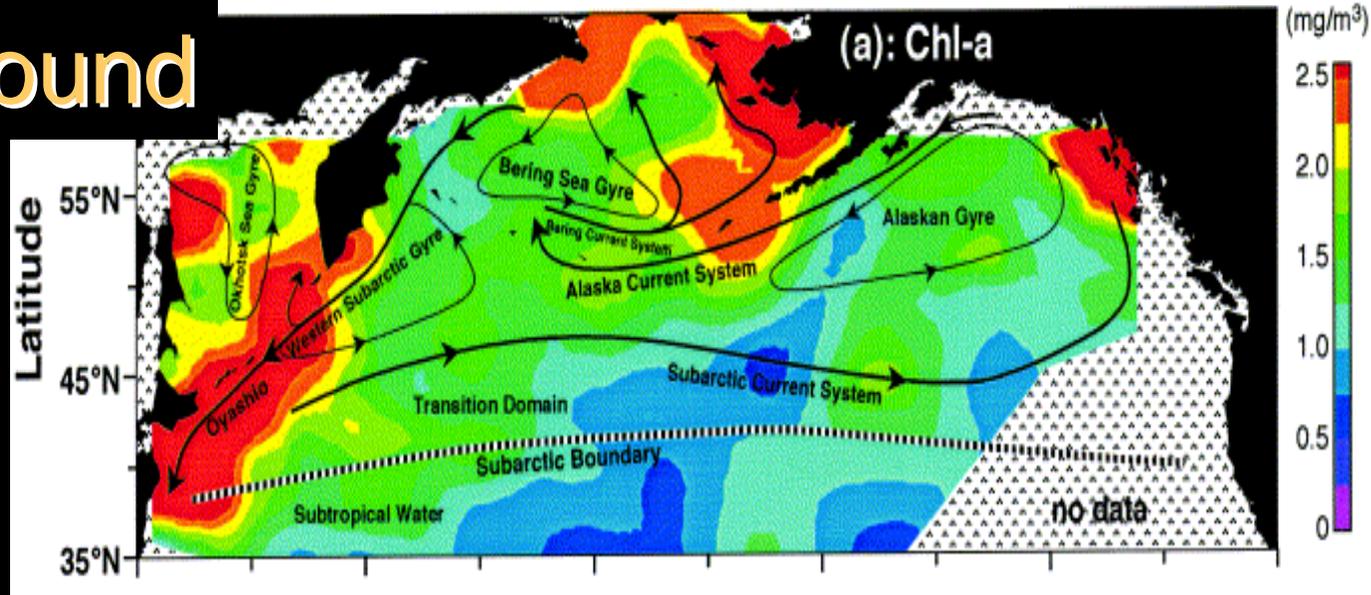
Sei-ichi Saitoh (*Hokkaido University, Japan*)



Contents

1. Background
2. Objective
3. Data
4. Methods
5. Results and Discussion
6. Conclusions
7. Future study

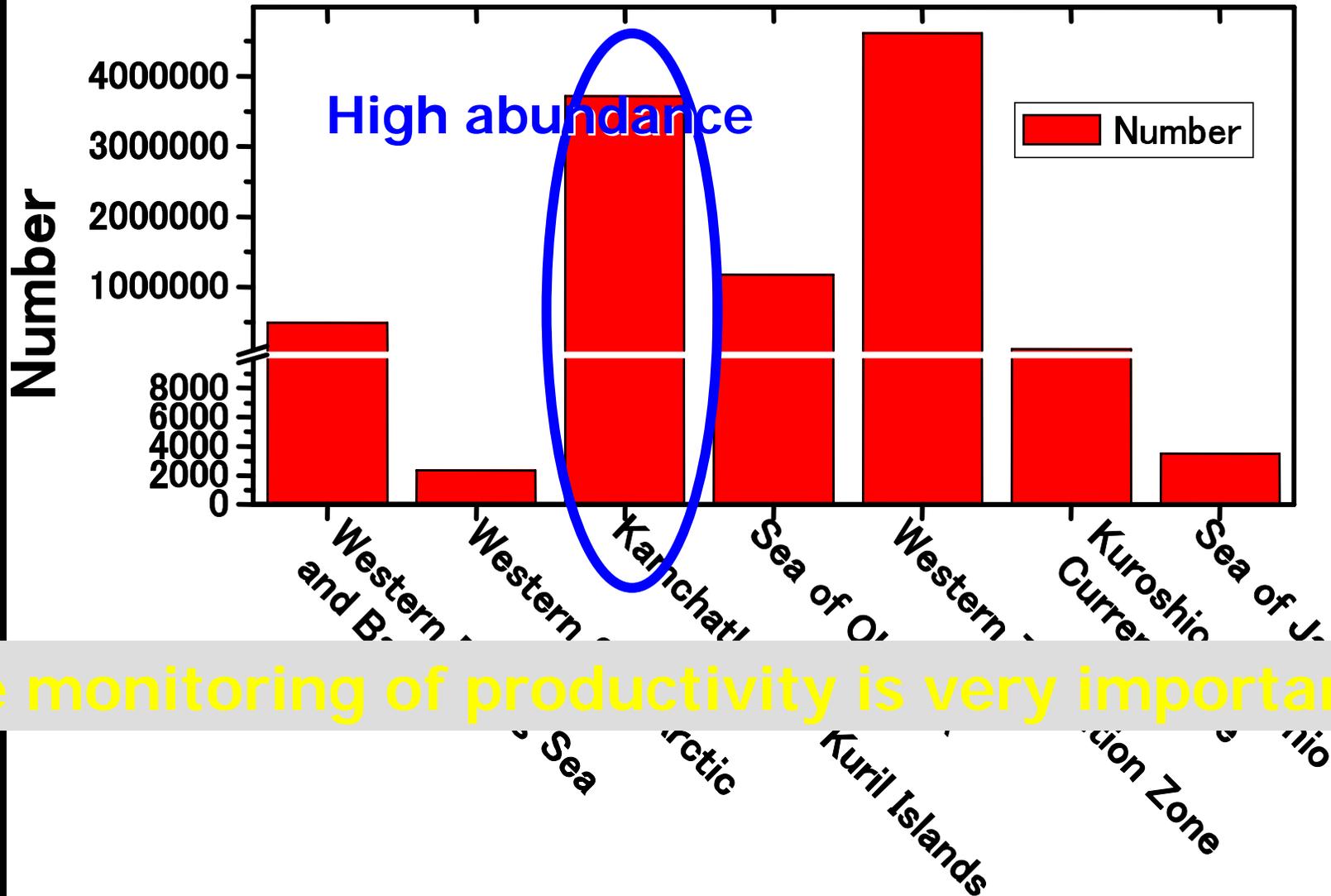
background



Mackas and Tsuda, 1999

- ◇ The Oyashio is formed by the exchange between the Okhotsk Sea water and the Eastern Kamchatka Current (*Kono and Kawasaki, 1997*)
- ◇ Mesoscale eddies affect the water exchange and surface circulation (*Rogachev, 2000, Kono and Kawasaki, 1997, Rabinovich et al., 2002*)
- ◇ There are two processes of eddy formation (*Yasuda et al., 2000*)
 - Outflowing from Okhotsk Sea
 - Translated Kuroshio warm-core rings are arrested near the Busso

Estimated abundance of marine mammals in PICES sub-regions during summer



The monitoring of productivity is very important

◇ High productivity in the North Pacific (*Sasaoka et al., 2002, PICES SCIENTIFIC REPORT, 2000*)

Objective

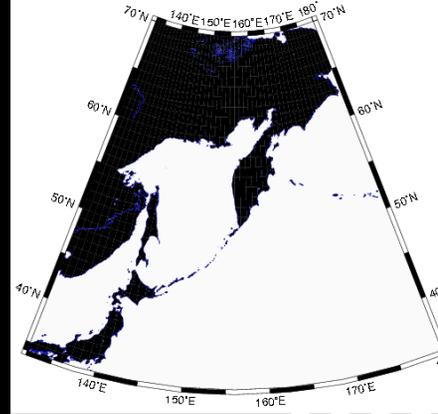
Final goal

To clarify the variability of the productivity and the influence to the ecosystem in the Eastern Kamchatka Current and Oyashio region

Approach to the final goal

- **To examine the difference of the characteristic of the spatial variability in this area**
- **To clarify the characteristic of the temporal variability in this area**
- **To make clear the influence to the variability of the productivity in this area**

Data



1948

1985

1995

1998

2003

NOAA/AVHRR

Sea Surface Temperature, 9km

DMSP/ SSMI

Wind Speed, 0.25°

Orbview-2/SeaWiFS

Photosynthesis Active Radiance, 9km

Orbview-2/SeaWiFS

Chlorophyll a Concentration, 9km

VGPM model(Behrenfeld and Falkowski,1997)

Primary Production

Levitus

Mixed Layer Depth , 1° grid, monthly

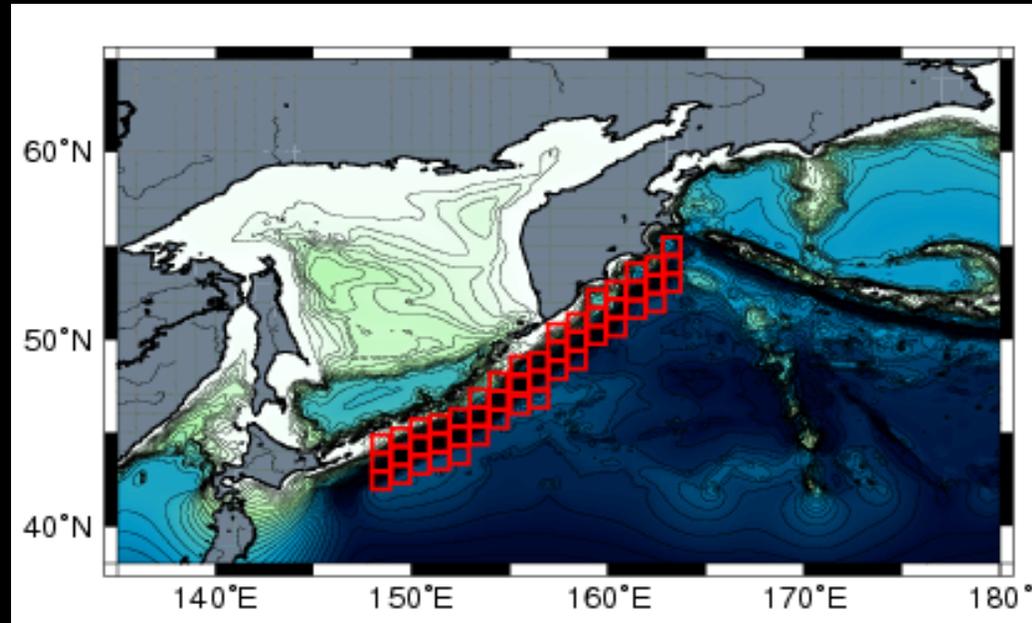
Method

We calculated the 1° grid averaged chl-*a* from the Eastern Kamchatka Current region to along the Kuril Islands

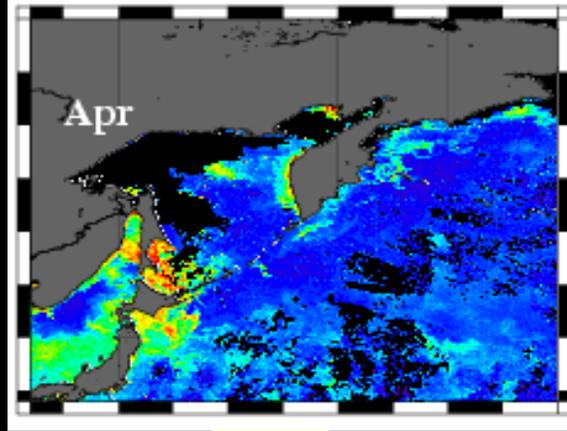
Estimate the month getting maximum chl-*a* concentration and the maximum value

$$\text{Ratio} = \frac{\text{maximum}}{\text{minimum}}$$

Clarify the characteristic of the seasonal variability



Methods



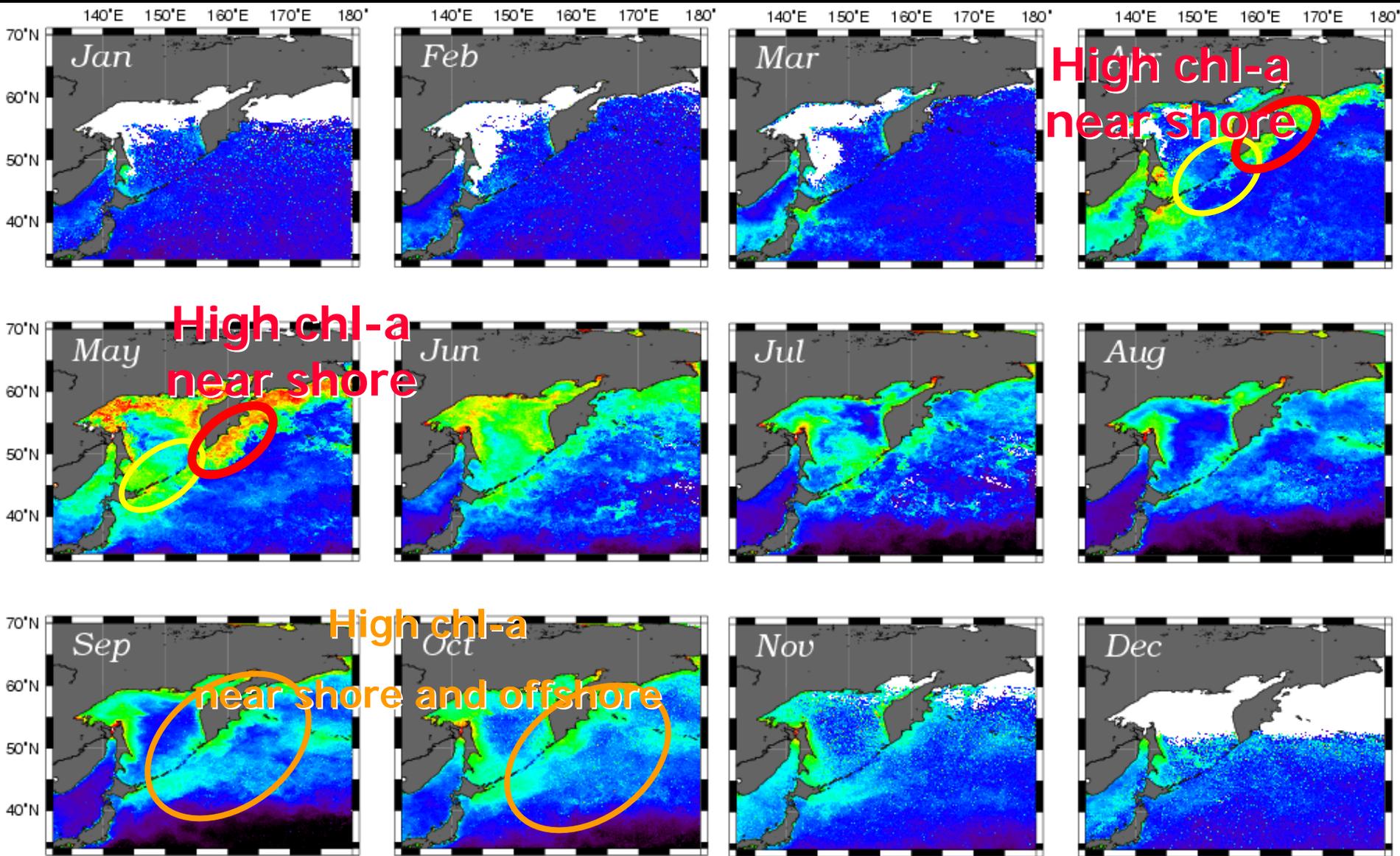
Calculate average of
chl-a during 6years

1998~2003

Estimate chl-a anomaly

Clarify the interannual variability

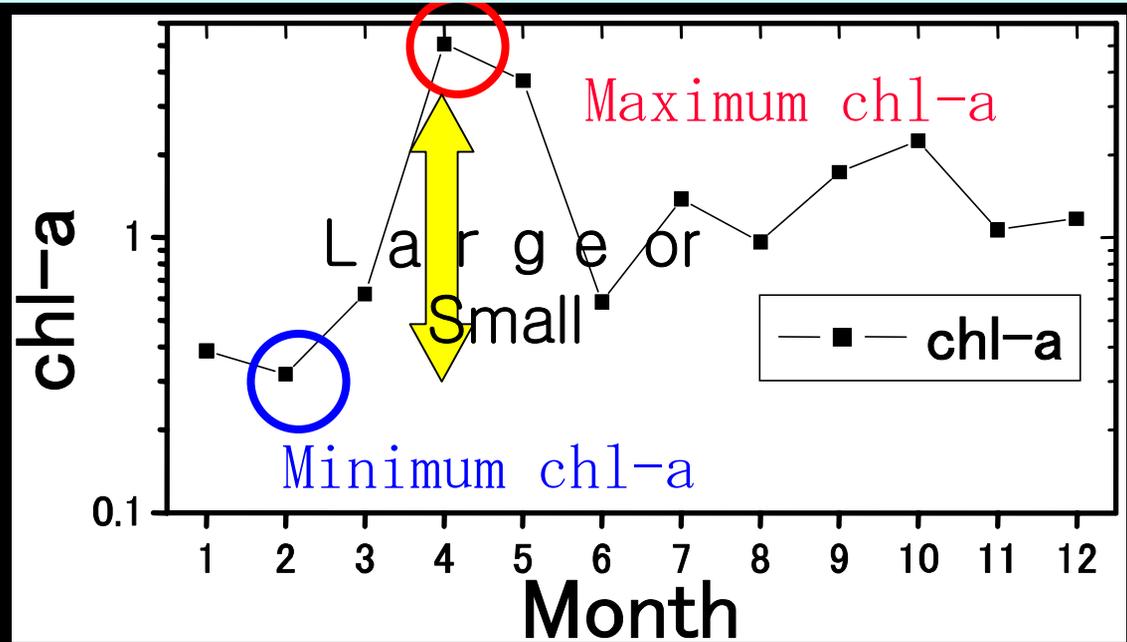
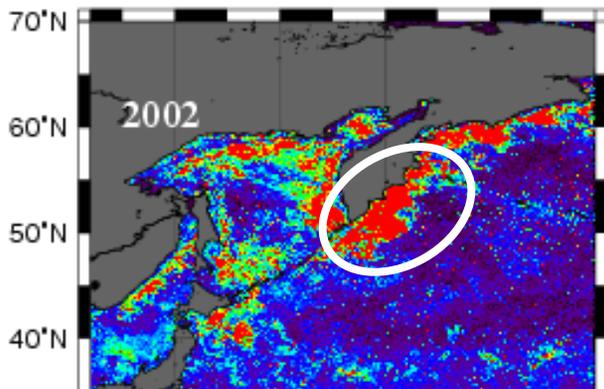
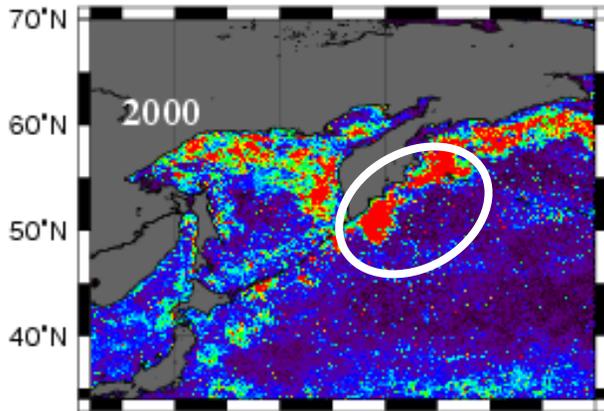
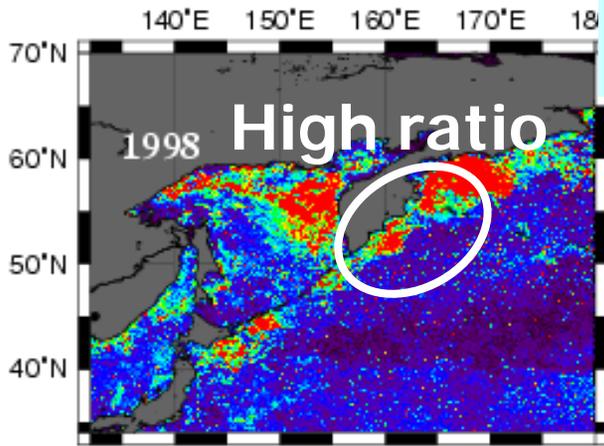
Results and Discussion Monthly mean chl-a images during 6years



Sea surface chl-a



Magnitude of seasonal variability

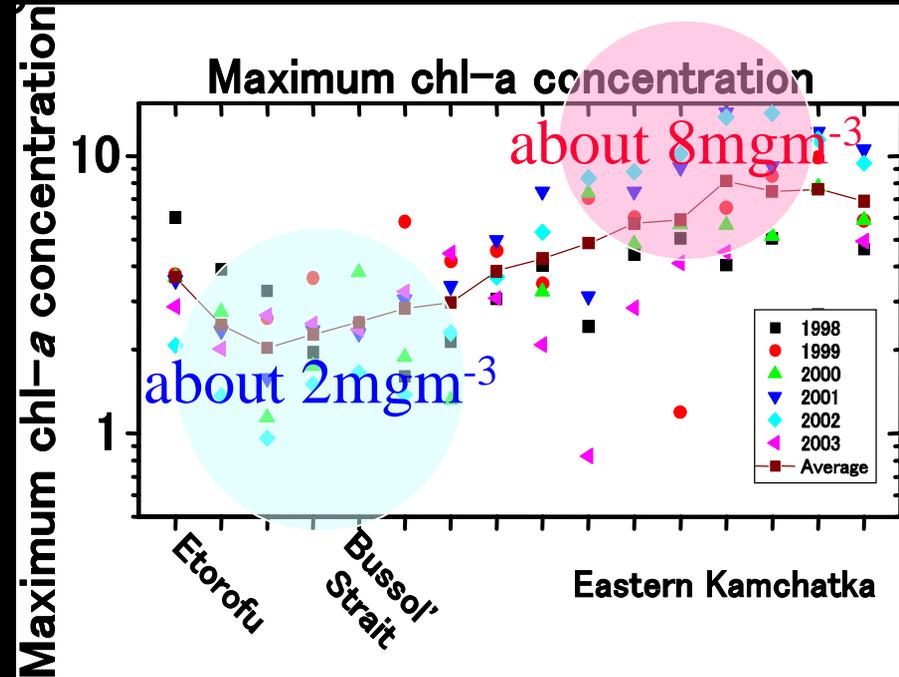
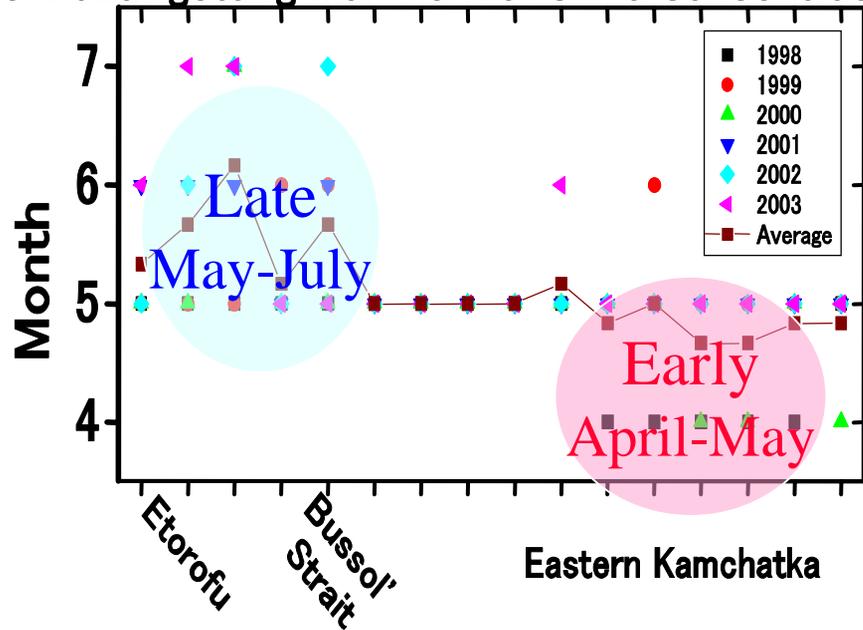


Ratio = maximum value / minimum value

Seasonal variability
Kamchatka > Kuril Islands

The month getting maximum chl-a concentration and the

The month getting maximum of chl-a concentration

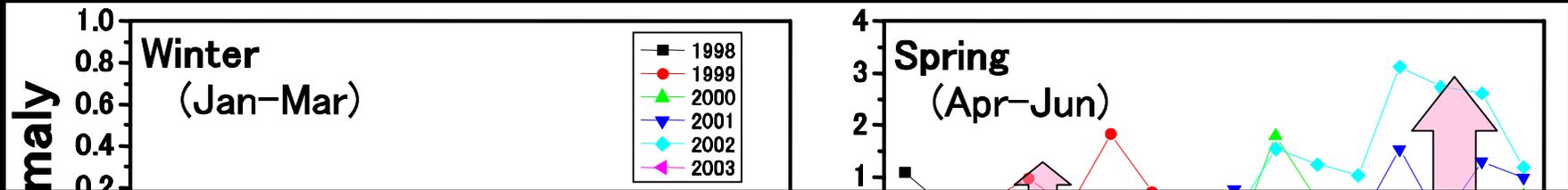


The increase of chl-a along the Kuril Island was later than around the Kamchatka Peninsula

Chl-a along the Kuril Islands was much lower than that around the Kamchatka Peninsula

Interannual variability

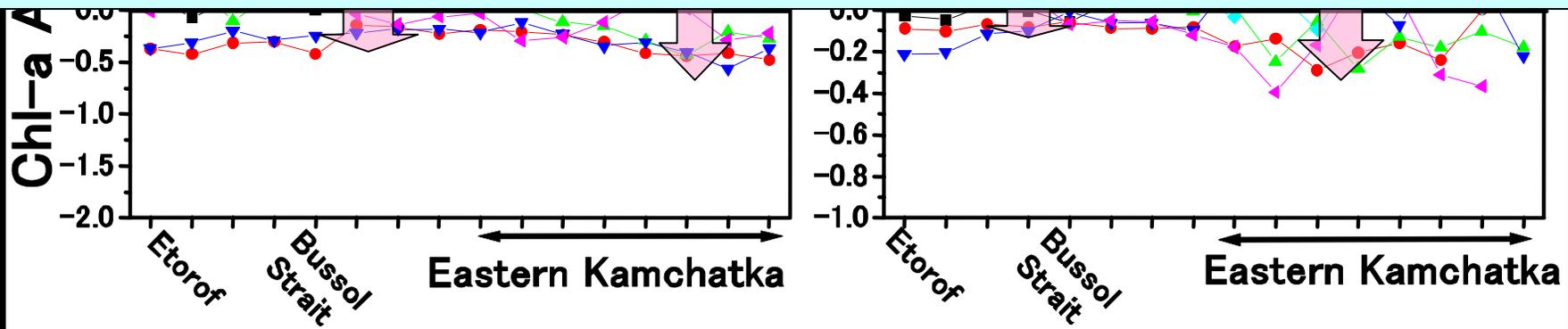
Chl-a anomaly each season

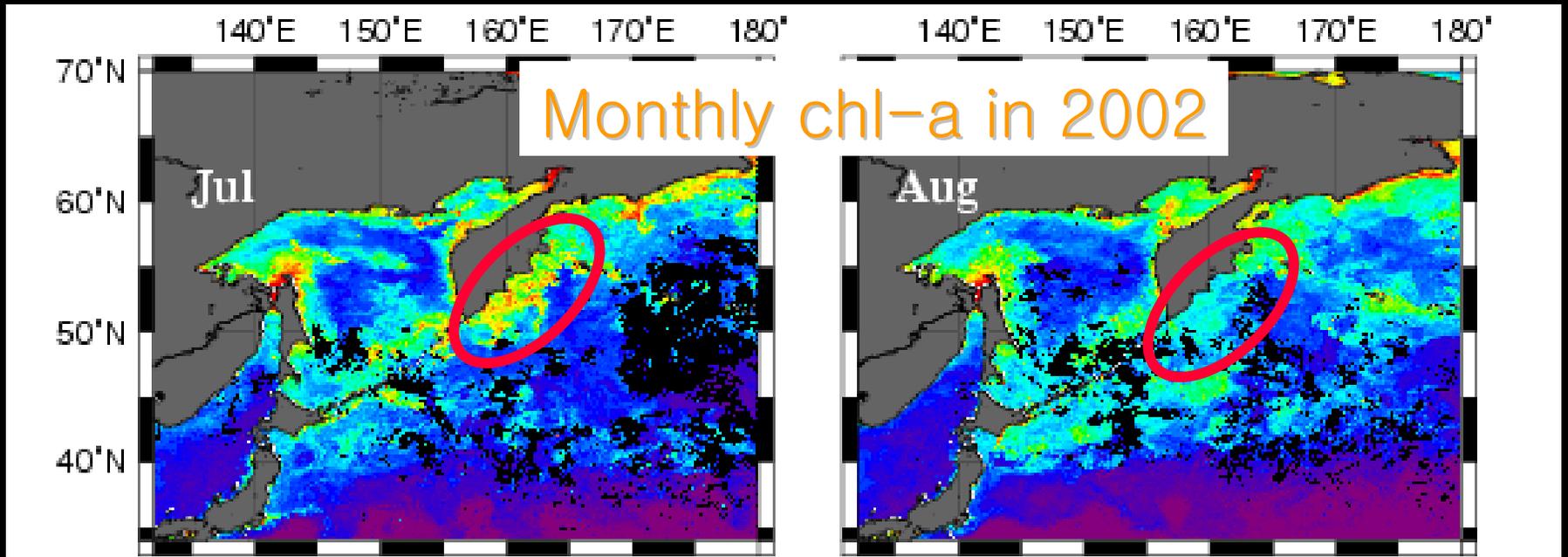
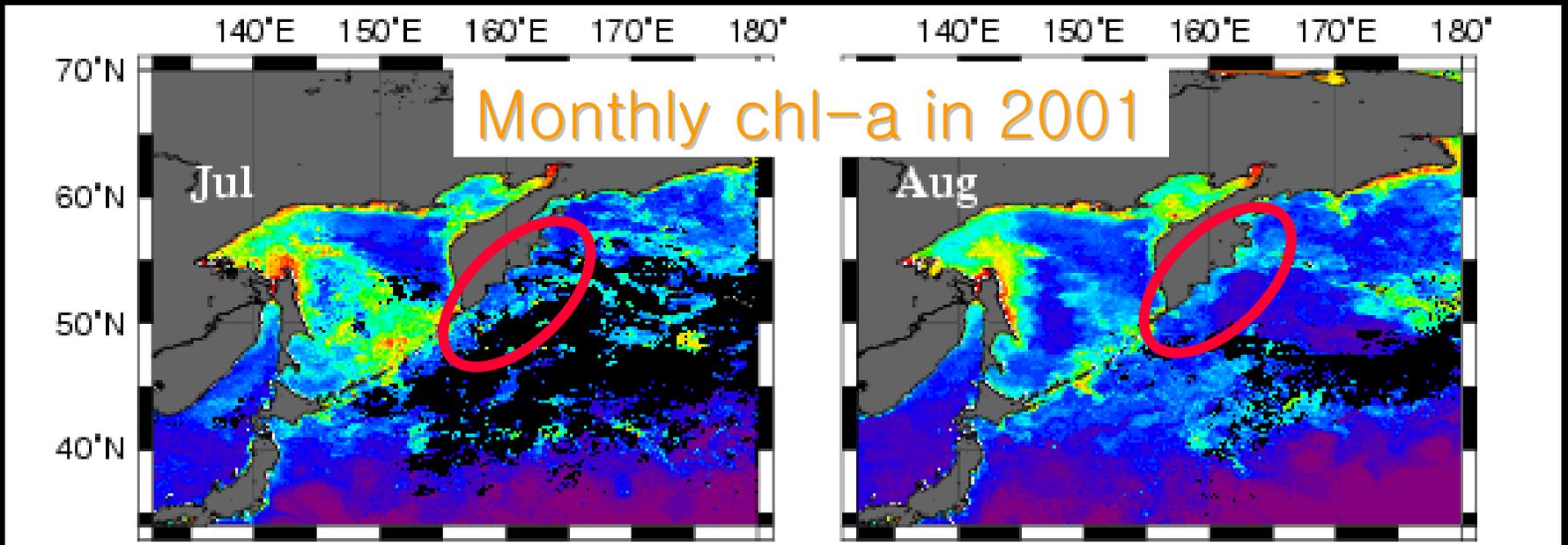


Interannual variability

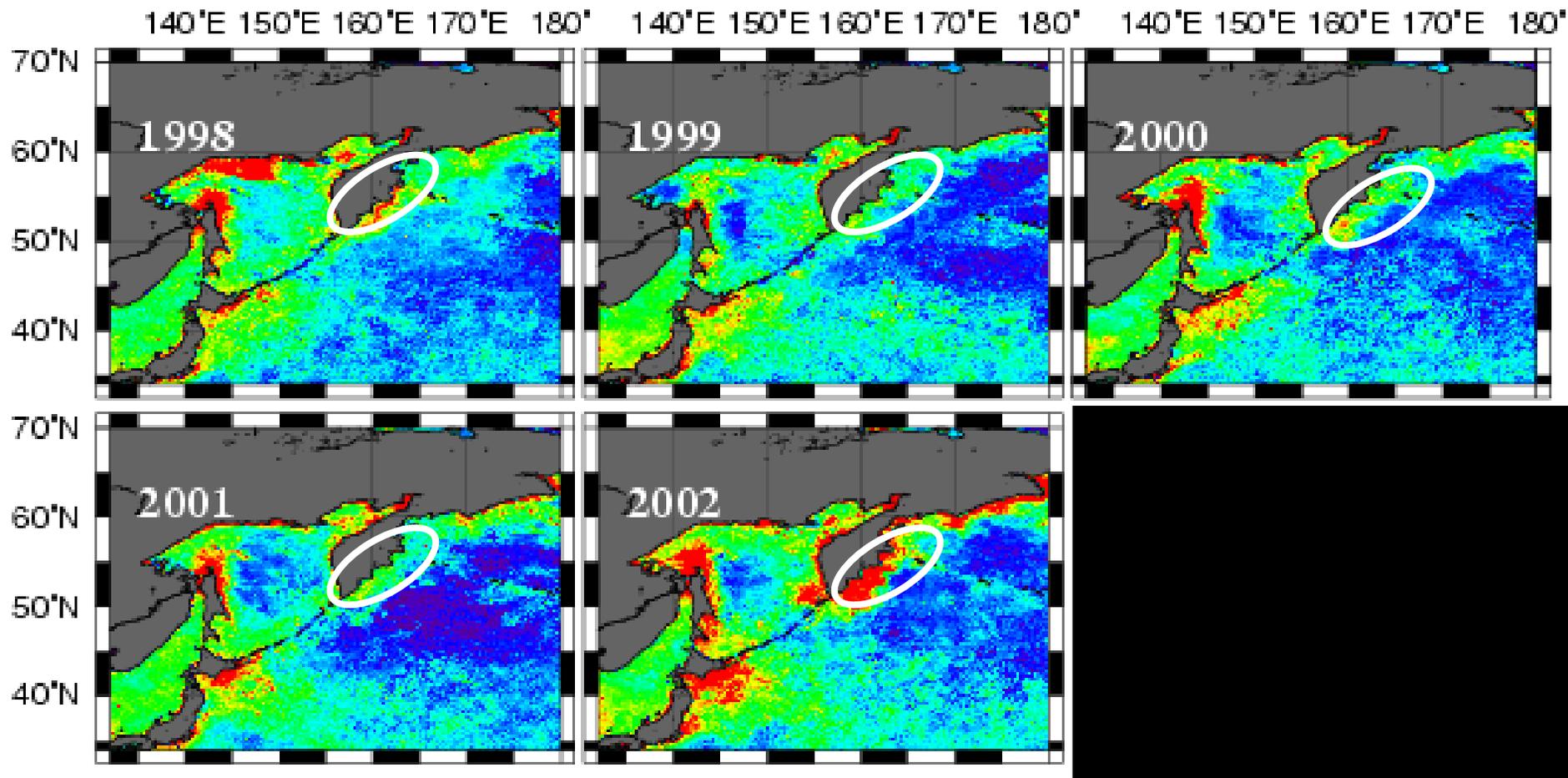
Along the Kuril Islands < Around the Kamchatka

Chl-a in summer 2002 is the highest in 6 years around the Kamchatka Peninsula





Total primary production



In 2002 total primary production
is highest in 5 years !!

Conclusions

Chl-a around the Kamchatka Peninsula was much higher than that along the Kuril Islands

The seasonal and interannual variability of chl-a around the Kamchatka Peninsula is larger than that along the Kuril Islands

the late increase in chl-a along the Kuril Islands in spring may be due to the late surface stratification in spring

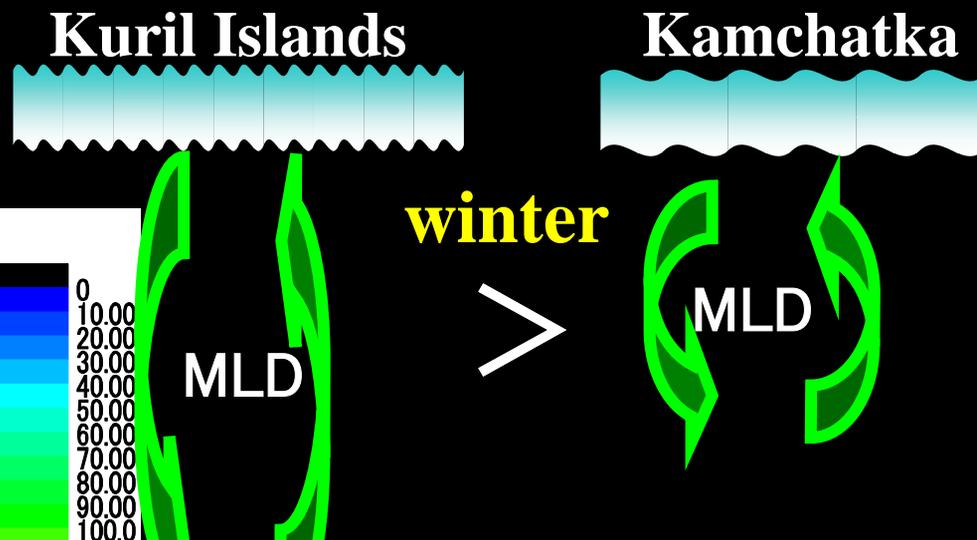
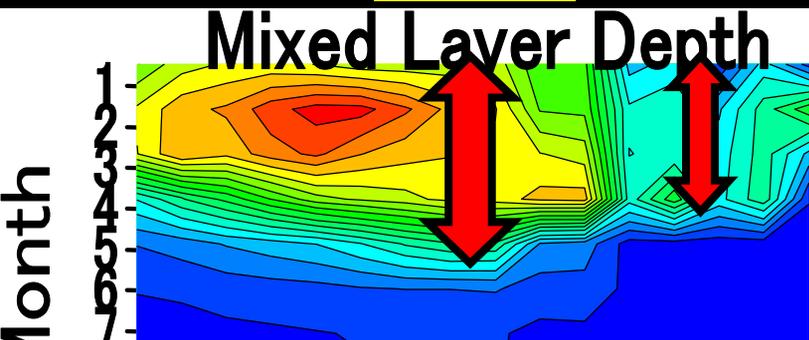
Future works

To clarify the mechanism of the variability of productivity

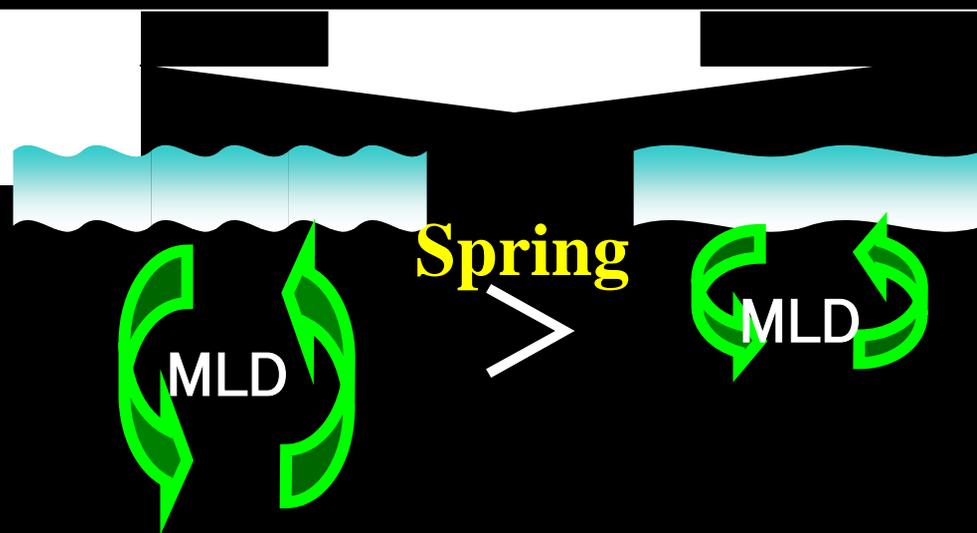
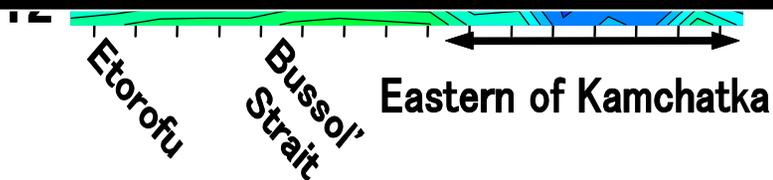
1. Why is chl-a increasing along the Kuril Islands late ??

2. Why was chl-a high in summer 2002 ??

Why chl-a increasing along the Kuril Islands is late??



The late increase in chl-a along the Kuril Islands in spring may be due to the late surface stratification in spring





Thank you

Photo : Mirai Cruise around the Kamchatka Peninsula in August 2004